ABSTRACT OF THE DISCLOSURE

Disclosed is a fabrication process of a highly reliable semiconductor device formed by stacking and pattering a polycrystalline silicon film, a tungsten nitride film and a tungsten film over a gate insulator film on a semiconductor substrate, thereby forming gate electrodes. Then, a conductive plasma processing is performed using an ammonia gas at a temperature for the semiconductor substrate of 500°C or lower, thereby nitriding the side wall for the gate electrode to form a nitride film, and then conducting plasma processing by using an oxygen gas in a state at a temperature for the semiconductor substrate of 500°C or lower thereby restoring damages or defects in the silicon oxide film present in the surface portion of the semiconductor substrate at the periphery of the gate electrode.